## ANNALS OF THE NEW YORK ACADEMY OF SCIENCES

Volume 488 December 31, 1986

## MEMBRANE PATHOLOGY<sup>a</sup>

Editors and Conference Organizers
G. BIANCHI, E. CARAFOLI, AND A. SCARPA

CONTENTS	
Introductory Remarks. By G. BIANCHI, E. CARAFOLI, and A. SCARPA	xi
I. Mitochondrial Disease B. CHANCE, Chair	
Mitochondrial Pathology: An Overview. By ERNESTO CARAFOLI	1
Cytochrome Oxidase Deficiency: Clinical and Biochemical Heterogeneity. By SALVATORE DIMAURO, MASSIMO ZEVIANI, SERENELLA SERVIDEI, EDUARDO BONILLA, ARMAND F. MIRANDA, ALESSANDRO PRELLE, and ERIC A. SCHON	19
Mitochondrial Myopathies Involving the Respiratory Chain: A Biochemical Analysis. By S. Takamiya, W. Yanamura, R. A. Capaldi, N. G. Kennaway, R. Bart, R. C. A. Sengers, J. M. F. Trijbels, and W. Ruitenbeek	33
The ADP/ATP Carrier as a Mitochondrial Auto-antigen—Facts and Perspectives. By HP. SCHULTHEISS, K. SCHULZE, U. KÜHL, G. ULRICH, and M. KLINGENBERG	44
Studies on Giant Mitochondria. By Bernard Tandler and Charles L. HOPPEL	65
Cystic Fibrosis—A Lethal Exocrinopathy with Altered Mitochondrial Calcium Metabolism. By ROBERT J. FEIGAL and BURTON L. SHAPIRO	82
Targeting of Nuclear-Encoded Proteins to the Mitochondrial Matrix: Implications for Human Genetic Defects. By Leon E. Rosenberg, WAYNE A. FENTON, ARTHUR L. HORWICH, FRANTISEK KALOUSEK, and JAN P. KRAUS	99
Inborn Defects of the Mitochondrial Portion of the Urea Cycle. By J. P. COLOMBO, C. BACHMANN, and AURELIA SCHRÄMMLI	109
Transport and Function of Carnitine: Relevance to Carnitine-Deficient Diseases. By Noris Siliprandi	118
Effects of Ethanol on the Structure and Function of Rat Liver Mitochondrial and Microsomal Membranes. By Theodore F. Taraschi, William S. Thayer, John S. Ellingson, and Emanuel Rubin	127

<sup>&</sup>lt;sup>a</sup>This volume is the result of a conference entitled Conference on Biological Membrane Pathology, held in Como, Italy on May 19–22, 1986 and sponsored by the New York Academy of Sciences.

Phosphorus Magnetic Resonance Spectroscopy Studies of the Role of Mitochondria in the Disease Process. By B. Chance, J. S. Leigh, D. S. Smith, S. Nioka, and B. J. Clark	140	
II. Hypertension A. P. SOMLYO, Chair		
Biological Membranes in Hypertension: Is Control of Intracellular Calcium and Other Ions Mediated by a Membrane Defect? By L. H. OPIE and D. A. DAVEY	154	
Ion Transport and Volume Regulation in Red Blood Cells. By MARK A. MILANICK and JOSEPH F. HOFFMAN	174	
Na <sup>+</sup> Transport in Primary Hypertension. By RICARDO GARAY, CLELIA ROSATI, and PHILIPPE MEYER	187	
The Cytoskeleton of Rat Aortic Smooth Muscle Cells: Normal Conditions, Experimental Intimal Thickening, and Tissue Culture. By G. GABBIANI	196	
Sodium/Calcium Exchange in Vascular Smooth Muscle: A Link between Sodium Metabolism and Hypertension. By Mordecai P. Blaustein, Terunao Ashida, William F. Goldman, W. Gil Wier, and John M. Hamlyn	199	
Chemical and Clinical Studies of Endogenous Digitalis-Like Factor in Hypertension. By J. F. CLOIX, M. A. DEVYNCK, and P. MEYER	217	
Calcium and Sodium in Vascular Smooth Muscle. By Andrew P. Somlyo, RAYMOND BRODERICK, and AVRIL V. SOMLYO.	228	
Ca <sup>2+</sup> Signalling in Exocrine Glands in Comparison to that in Vascular Smooth Muscle Cells. By I. SCHULZ, S. SCHNEFEL, H. BANFÍC, and L. ECKHARDT	240	
Platelet Calcium-Linked Abnormalities in Essential Hypertension. By Thérèse J. Resink, Dimitar Dimitrov, Aino Zschauer, Paul Erne, Vsevolod A. Tkachuk, Fritz R. Bühler	252	
Membrane Abnormalities in Essential Hypertension: Physiologic and Genetic Links. By Giuseppe Bianchi, Patrizia Ferrari, Daniele Cusi, Barry R. Barber, Sergio Salardi, Lucia Torielli, Maria Grazia Tripodi, Enrico Niutta, Giuseppe Vezzoli, and Cristina Barlassina	266	
Pathophysiology of the Na Exchange and Na-K-Cl Cotransport in Essential Hypertension: New Findings and Hypotheses. By MITZY L. CANESSA	276	
II. Diabetes A. I. WINEGARD, Chair		
Quantitative Histochemical Approaches Are Essential for Investigating Fundamental Questions of Diabetes Research. By Franz M. MATSCHINSKY, FRANCISCO BEDOYA, LESLIE MACGREGOR, TAKAO SHIMIZU, and JEANNE WILSON	281	
The Morphology of Proinsulin Processing. By L. ORCI	292	
Signal Transduction in Insulin Secretion: Comparison between Fuel Stimuli and Receptor Agonists. By CLAES WOLLHEIM and TREVOR J. BIDEN	317	

Altered Sorbitol and myo-Inositol Metabolism as the Basis for Defective Protein Kinase C and (Na,K)-ATPase Regulation in Diabetic Neuropathy. By DOUGLAS A. GREENE and SARAH A. LATTIMER	334
Transmembrane Ion Distribution and Insulin Secretion. By PETER RONNER	341
Cell Biology of Insulin's Stimulatory Action on Glucose Transport and Its Perturbation in Altered Metabolic States. By BARBARA B. KAHN and SAMUEL W. CUSHMAN	356
Mechanisms Whereby Insulin and Other Hormones Binding to Cell Surface Receptors Influence Metabolic Pathways within the Inner Membrane of Mitochondria. By RICHARD M. DENTON, JAMES G. McCORMACK, and ANDREW P. THOMAS	370
Characterization of Mediators of Insulin Action. By W. K. GOTTSCHALK, S. L. MACAULAY, J. O. MACAULAY, K. KELLY, J. A. SMITH, and L. JARETT	385
The Role of Calcium and Calmodulin in Insulin Receptor Function in the Adipocyte. By JAY M. McDonald, Harrihar A. Pershadsingh, and Jerry Colca	406
Mechanism of Receptor Kinase Action on Membrane Protein Recycling. By S. Corvera, R. J. Davis, P. J. Roach, A. DePaoli-Roach, and M. P. Czech	419
IV. Cancer Cells	
G. SALVATORE, Chair	
Biological Membranes and Malignancy: An Overview of Pharmacological Opportunities. By RUSSELL G. GREIG and GEORGE POSTE	430
The Role of Mitochondrial Hexokinase Binding in the Abnormal Energy Metabolism of Tumor Cell Lines. By RICHARD A. NAKASHIMA, LAURA J. SCOTT, and PETER L. PEDERSEN	438
Membrane Cholesterol and Tumor Bioenergetics. By PETER S. COLEMAN	451
Membrane Alterations in Cancer Cells: The Role of Oxy Radicals. By TOMMASO GALEOTTI, SILVIA BORRELLO, GIORGIO MINOTTI, and	468
LANFRANCO MASOTTI	481
Transmembrane Signalling by Growth Factors. By W. H. MOOLENAAR, L. H. K. DEFIZE, B. C. TILLY, A. J. BIERMAN, and S. W. DE LAAT	491
Poster Papers	
Lack of Subunit II of Cytochrome c Oxidase in a Patient with Mitochondrial Myopathy. By Masashi Tanaka, Morimitsu Nishikimi, Takayuki Ozawa, Shigeaki Miyabayashi, and Keiya Tada	503
The Relationship between the Expression of the Mitochondrial Genome and Plasma Membrane Properties in Thymocytes and Leukemic Cells in the Rat. By C. VAN DEN BOGERT, S. KUZELA, T. MELIS, and A. M. KROON	505

Defects of Complex I and Complex IV in Skeletal Muscle from Patients with Chronic Progressive External Ophthalmoplegia. By H. S. A. SHERRATT, M. A. JOHNSON, and D. M. TURNBULL	508
Defects in Mitochondrial Beta Oxidation. By H. R. SCHOLTE, I. E. M. LUYT-HOUWEN, W. BLOM, H. F. M. BUSCH, P. C. DE JONGE, M. DE VISSER, J. G. M. HUIJMANS, F. G. I. JENNEKENS, P. D. MOOY, H. PRZYREMBEL, R. B. H. SCHUTGENS, M. H. M. VAANDRAGER-VERDUIN, and R. N. A. VAN COSTER.	511
Biochemical Criteria for NADH-CoQ Reductase Deficiency. By HANS R. SCHOLTE, INEZ E. M. LUYT-HOUWEN, HERMAN F. M. BUSCH, and M. HEDWIG VAANDRAGER-VERDRUIN	513
Mitochondrial Involvement in Causing Cell Injury in Experimental Hepatic Iron Overload. By A. MASINI, T. TRENTI, D. CECCARELLI, and U. MUSCATELLO	517
On the Role of Mitochondria in Cell Injury Caused by Ca <sup>2+</sup> Overload: A Study with Vanadate and Isolated Hepatocytes. <i>By G. Bellomo, F. Mirabelli, P. Crinó, G. Finardi, G. Viani, F. Rossi, and P. Richelmi</i>	520
Mitochondrial Myopathy due to Complex I Deficiency: Secondary Changes. By H. F. M. Busch, H. R. Scholte, and I. E. M. Luyt-Houwen	523
Role of Plasma Membrane Potential in Granulocyte Activation. By Francesco DI VIRGILIO, P. DANIEL LEW, TOMMY ANDERSSON, SUSAN TREVES, and TULLIO POZZAN	525
Altered Free Cytosolic Ca <sup>2+</sup> Changes in fMet Leu Phe-Stimulated Neutrophils from Patients with Bartter's Syndrome. By L. Caló, S. Cantaro, F. DI VIRGILIO, S. FAVARO, and A. BORSATTI	527
Renal Function in Cystic Fibrosis. By B. M. Assael, G. Marra, S. A. Tirelli, G. Cavanna, A. Claris Appiani, A. Giunta, M. Amoretti, and S. Milani	530
Phosphorylation of Band 3 Protein in Nephrolithiasis. By G. CLARI, B. BAGGIO, G. MARZARO, G. GAMBARO, A. BORSATTI, and V. MORET	533
β-Adrenergic Receptors and Adenylate Cyclase Activity in Erythrocyte Membranes from Spontaneously Hypertensive Rats. By P. CHATELAIN, P. ROBBERECHT, and J. CHRISTOPHE	537
Hypothalamic Factor Regulates Sodium Pump Activity in Cultured Renal Tubular Epithelial Cells. By Garner T. Haupert, Jr., Edward Chen, Swapna Ray, and Horacio F. Cantiello	540
Inhibition of Ca <sup>2+</sup> Influx-Dependent Contraction of Vascular Smooth Muscle by Amiloride. <i>By</i> S. Bova, G. Cargnelli, and S. Luciani	543
Magnesium Sulphate Does Not Prevent the Malignant Hyperthermia Episode.  By J. R. LÓPEZ, V. SÁNCHEZ, M. MENDOZA, and F. SRETER	546
Human Glomerular Basement Membrane: Altered Binding Characteristics following in Vitro Non-enzymatic Glycosylation. By M. SENSI, P. TANZI, M. R. BRUNO, M. MANCUSO, and D. ANDREANI	549
Hemodynamic Mechanisms of the Blood Pressure Response to Atrial  Natriuretic Factor in the Dog: Effects of Vagotomy. By M. Volpe, A.  Cuocolo, F. Vecchione, M. Condorelli, and B. Trimarco	553

Catecholaminergic Receptors in Kidney of Milano Hypertensive Rats. By A. S. TIRELLI, B. M. ASSAEL, G. CAVANNA, R. ROSSI, P. FERRARI, and F. SERENI	555
Sodium Transport in Membrane Vesicles from Kidney of the Milan Hypertensive Rat Strain. By P. Parenti, G. Caspani, and G. M.	558
Volumes and Na Transports in Intact Red Blood Cells, Resealed Ghosts, and Inside-Out Vesicles of Milan Hypertensive Rats. By P. FERRARI, L. TORIELLI, M. FERRANDI, and G. BIANCHI	561
Abnormalities of Red Cell Membrane Calcium Handling in the Milan Hypertensive Strain of Rat. By M. CIRILLO, F. GALLETTI, and P. STRAZZULLO	565
The Relationship between Myoplasmic Calcium and Force Developed during Stimulation of Arterial Smooth Muscle: A Study with Fura 2. By GIACOMO BRUSCHI, MARIA E. BRUSCHI, ANGELO CAVATORTA, and ALBERICO BORGHETTI	567
Endogenous Digitalis-like Factor(s) in Human Plasma: Binding to Specific Antiserum, Red Blood Cells, and Plasma Proteins. By S. BALZAN, S. GHIONE, A. CLERICO, and U. MONTALI	570
Ion Transport in Red Blood Cells and Antihypertensive Therapy. By E. NIUTTA M. G. TRIPODI, C. PATI, D. CUSI, C. BARLASSINA, F. DOSSI, and G. BIANCHI	573
Heritability of Sodium Transport Systems and Hypertension. By Daniele Cusi, Grazia Tripodi, Elena Alberghini, Enrico Niutta, Cristina Barlassina, Emilio Fossali, Fiorella Dossi, and Giuseppe Bianchi	576
Membrane Properties of the Human Colon Tumor Cell Line HT-29. By G. ESPOSITO, E. BOMBARDIERI, M. G. COCCIOLO, C. LINDI, M. VALTOLINA, P. MARCIANI, and M. R. GIORIA	579
Altered Membrane Bound Protein Kinase Activities in Lymphoid Cells Transformed by Moloney and Abelson Leukemia Viruses. By LORENZO A. PINNA, ANNA MARIA BRUNATI, DANIELA SAGGIORO, and LUIGI CHIECO-BIANCHI	582
Index of Contributors	585
Financial assistance was received from:	
• FARMITALIA—CARLO ERBA	
• FIDIA FARMACEUTICI, ITALIA	
• SIGMA-TAU FARMACEUTICI, ITALIA	
• SQUIBB—ITALIA	
ADDITIONAL CONTRIBUTIONS HAVE BEEN RECEIVED FROM	
• BAYER AG/MILES, U.S.A.	
BRISTOL MYERS, U.S.A.	
<ul> <li>DEPARTMENT OF THE NAVY—OFFICE OF NAVAL RESEARCH (GRANT N00014-86-G-0077)</li> </ul>	ſ

• EASTMAN KODAK CORPORATION

· GÖDECKE AG, F.R.G.

- · HOECHST PHARMA AG, SWITZERLAND
- · ITALIAN NATIONAL RESEARCH—C.N.R. ITALIA
- MERCK, SHARP & DOHME RESEARCH LABORATORIES, ITALIA
- MERCK, SHARP & DOHME RESEARCH LABORATORIES, U.S.A.
- · SANDOZ, U.S.A.
- · SCHERING AG, F.R.G.
- SCHERING-PLOUGH CORPORATION
- SMITH KLINE & FRENCH LABORATORIES, U.S.A.
- SOUIBB CORPORATION
- · S.P.A.—ITALIA
- STUART PHARMACEUTICALS/DIVISION OF ICI AMERICAS, INC.

The New York Academy of Sciences believes it has a responsibility to provide an open forum for discussion of scientific questions. The positions taken by the participants in the reported conferences are their own and not necessarily those of the Academy. The Academy has no intent to influence legislation by providing such forums.

